

At Lock Haven, Pa., the Susquehanna River was frozen on the 25th and 26th. The Fox River was covered with thin ice, the first of the season, at Green Bay, Wis., on the 22d. The Illinois River was frozen at Ottawa, Ill., on the 22d, and at Hennepin, Ill., on the 23d. The Manitowoc River was closed by ice on the 20th. The Saint Croix River was frozen and persons were crossing on the ice at Osceola Mills, Wis., on the 22d.

Navigation on the Red River of the North was closed at Grand Forks, N. Dak., on the 8th. The Cheyenne River was frozen at Gallatin, N. Dak., on the 5th, and on the 8th persons were crossing on the ice at that place. The North Platte River was frozen at Saratoga, Wyo., on the 16th. The Black River was frozen at Port Huron, Mich., on the 23d. The first ice of the season was reported on the bay at Sandusky, Ohio, on the 4th. A report from Toledo, Ohio, dated the 23d stated that Maumee Bay was covered by a sheet of heavy ice. At Manistee, Mich., navigation was practically closed on the 30th. On the 27th navigation was obstructed by ice at the head of Sturgeon Bay, Wis.

STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark Nov., 1892, (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>						
Shreveport, La.	29.9	14.6	18	7.6	1	7.0
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	7.9	4	1.9	27, 28	6.0
Little Rock, Ark.	23.0	11.0	6	6.5	25	4.5

Heights of rivers—Continued.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Missouri River.</i>						
Fort Buford, N. Dak.		5.3	9-15	3.8	21, 22	1.5
Bismarck, N. Dak.	14.0	— 0.1	5-7, 14, 15	— 0.6	20	0.5
Pierre, S. Dak.	18.7	5.1	13, 16	4.5	9	0.6
Sioux City, Iowa	18.0					
Omaha, Neb.	21.0	5.8	7	4.3	30	1.5
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	2.1	1, 2	1.0	24	1.1
La Crosse, Wis.	11.8	2.8	30	0.9	25	1.9
Dubuque, Iowa	16.0	3.0	2	2.0	25	1.0
Davenport, Iowa	15.0	1.9	18	0.0	30	1.9
Keokuk, Iowa	14.0	1.7	2	— 0.8	26	2.5
Hannibal, Mo.	17.0	2.3	2, 6	0.8	30	1.5
Saint Louis, Mo.	30.0	6.1	1	4.3	30	1.8
Cairo, Ill.	40.0	8.0	30	4.1	1	3.9
Memphis, Tenn.	33.0	4.7	28, 29	1.8	1, 2	2.9
Vicksburg, Miss.	41.0	2.6	30	— 0.1	1	2.7
New Orleans, La.	13.0	4.4	9	2.9	3, 5, 23	1.5
<i>Ohio River.</i>						
Parkersburg, W. Va.	38.0	6.2	23, 28	0.8	3	5.4
Cincinnati, Ohio	45.0	9.2	27, 28	3.5	5, 6	5.7
Louisville, Ky.	24.0	5.1	29	2.3	7	2.8
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	7.5	30	— 0.1	1-3, 6	7.6
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	7.0	12, 13	1.1	1	5.9
Knoxville, Tenn.	29.0					
<i>Monongahela River.</i>						
Pittsburg, Pa.	29.0	7.5	21	5.4	27	2.1
<i>Savannah River.</i>						
Augusta, Ga.	32.0	11.1	11	5.9	2	5.2
<i>Willamette River.</i>						
Portland, Oregon	15.0	6.4	25	0.5	2	5.9
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	3.6	23	0.5	1-8	3.1
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	8.4	14	0.7	1	7.7
<i>James River.</i>						
Lynchburg, Va.	18.0	3.0	19	0.0	1-9	3.0

* For 24 days.

† For 20 days.

‡ For 21 days.

§ For 25 days.

ATMOSPHERIC ELECTRICITY.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 14, on the 17th; in 10 on the 18th; in 8 on the 14th and 27th; in 7 on the 3d, 4th, and 26th; in 6 on the 1st, 5th, 6th, and 16th; in 5 on the 2d, 7th, and 15th; in 4 on the 8th; in 3 on the 9th, 10th, 19th, and 25th; in 2 on the 23d, 24th, and 28th; and in 1 on the 11th, 12th, 20th, 21st, and 22d. No thunderstorms were reported on the 13th, 29th, and 30th.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 13, in Mississippi; on 11 in Arkansas; on 10 in Missouri; on 9 in North Carolina; on 7 in Tennessee; on 6 in Alabama, Louisiana, and Texas; on 5 in Illinois, Kansas, New Jersey, and South Carolina; on 4 in Florida, Georgia, Oklahoma, Pennsylvania, and Virginia; on 3 in Indiana; on 2 in Indian Territory, Iowa, Kentucky, Michigan, and Montana; and on 1 in Connecticut, Maryland, New Hampshire, New York, Ohio, and Vermont.

West of the Rocky Mountains thunderstorms were reported in Arizona on the 1st and 29th; in California on the 23d and 27th to 30th; in Idaho on the 30th; and in Washington

on the 14th, 15th, and 29th. In states and territories other than those named no thunderstorms were reported.

AURORAS.

Auroras were reported as follows: 2d, Blue Knob, Pa. 3d, Hudson, Wis. 4th, Washington, D. C.; Beverly, N. J.; Quakertown, Pa.; Madison, Medford, Shell Lake, and Valley Junction, Wis. 6th, Blue Knob, Pa.; Weston, Wis. 10th, Harvey, Wis. 11th, Payette, Idaho; Harvey, Wis. 12th, Alta, Iowa. 13th, Payette, Idaho; Frankfort, S. Dak. 17th, Orono, Me.; Gallatin, N. Dak. 18th, Springview, Nebr.; Gallatin, Grand Forks, Napoleon, and Wild Rice, N. Dak. 19th, Honeymead Brook, N. Y. 21st, Willows, Cal. 22d, Honeymead Brook, N. Y. 23d, Harvey and Medford, Wis. 24th, Newton, N. J. 25th, Meeker, Colo.; Gardiner, Me. 26th, Fall River, Mass.; Warrensburg, Mo. 27th, Crandon, Wis. 28th, Hastain, Mo.; Glendive, Mont.

At Washington, D. C., a brilliant aurora was observed from 7.40 to 8.10 p. m. of the 4th. The moon was full, and a few globo-cumulus clouds appeared. Streamers of a deep crimson color, having the appearance of an illumination by Bengal fire, were seen in the northeast. Streamers appeared in the northwest about 10 minutes after the display in the northeast had reached its maximum intensity. The display was notable in that auroras are seldom sufficiently intense in the latitude of Washington to be visible during moonlight.

MISCELLANEOUS PHENOMENA.

METEORS.

Except in parts of the Lake region, generally along the eastern slope of the Rocky Mountains, and over the northern plateau region, where clouds obscured the sky, meteoric

showers were observed over the entire United States the night of the 23d. The following are extracts from special reports received relative to the displays:

At Fall River, Mass., the meteors averaged 3 to 4 a minute

and seemed to fall from the zenith. At Baltimore, Md., meteors were observed all night. At Washington, D. C., the display began shortly after sunset, and the meteors increased in number until after 11 p. m. From that time they decreased in number and were fainter, but were observed until daylight of the 24th. A large number of meteors were noted at Lynchburg, Va.; from 11 to 11.50 p. m. nearly 200 were counted; they seemed to start from the zenith, and a number had streamers. At Parkersburg, W. Va., meteors were observed from 8.30 p. m. till after midnight. At Pensacola, Fla., they were noted from 8 to 9 p. m., and were more numerous north of the zenith. A meteoric shower was observed at Auburn, Ala., the early part of the night. The display was at its height about 9 p. m., when 50 meteors were counted in 3 minutes. The meteors were mostly faint, and were more radiant near the zenith.

At Mobile, Ala., meteors, averaging about 2 per minute, were observed in the south and east quadrants from 10.30 to 11

p. m. At Vicksburg, Miss., the shower continued until 3 a. m. At Louisville, Ky., meteors were visible all night, the height of the display being about midnight. At Chicago, Ill., meteors were observed in the east quadrant from altitude 45° to the zenith, apparently moving towards the eastern horizon. At Rapid City, S. Dak., the display continued in the northeast from 11 p. m. until midnight. At Tucson, Ariz., meteors appeared north of the zenith at 9 p. m., moving northeast. At Monero, N. Mex., the display was noted in the zenith and in the northeast and east from 7.30 to 9 p. m. At Portland, Oregon, meteors were particularly numerous and brilliant at 9 p. m. At Roseburg, Oregon, 240 meteors were counted between the zenith and the eastern horizon.

DROUGHT.

In Ohio drought continued throughout the month, and water in springs, wells, and streams was low. Drought prevailed in Arizona; stock suffered on account of a scarcity of water, and mining interests were affected.

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for November, 1892, of the directors of the various state weather services:

ALABAMA.

Temperature.—Maximum, 89, at Healing Springs, 1st; minimum, 20, at Valley Head, 24th and 25th; greatest monthly range, 66, at Healing Springs; least monthly range, 44, at Mobile.

Precipitation.—Greatest monthly, 8.65, at Valley Head; least monthly, 0.17, at Bermuda.—*P. H. Mell, Observer, Weather Bureau, Auburn, director.*

ARIZONA.

Temperature.—Maximum, 90, at Fort Mohave, 11th; minimum, 12, at Winslow, 25th; greatest monthly range, 63, at Rancho del Pueblo; least monthly range, 32, at Dos Cabezos.

Precipitation.—Greatest monthly, 1.87, at Chiricahua Mountains; least monthly, 0.00, at a number of stations.

Wind.—Prevailing direction, southwest.—*J. C. Hayden, Observer, Weather Bureau, Tucson, director.*

ARKANSAS.

Temperature.—The mean was 0.7 below the normal; maximum, 79, at Eldorado, 27th; minimum, 20, at Rogers, 7th; greatest monthly range, 54, at Hot Springs; least monthly range, 40, at Malvern.

Precipitation.—The average was 1.34 above the normal; greatest monthly, 11.74, at Searcy; least monthly, 1.78, at Winslow.

Wind.—Prevailing direction, north.—*M. F. Locke, Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Local Forecast Official, Weather Bureau, assistant.*

CALIFORNIA.

Temperature.—Maximum, 95, at Rialto, 22d; minimum, 16, at Tehachapi, 25th; greatest monthly range, 64, at San Jacinto; least monthly range, 33, at Oakland.

Precipitation.—Greatest monthly, 23.09, at Edmonton; least monthly, 0.11, at Tehachapi.

Wind.—Prevailing direction, west.—*J. A. Barwick, Observer, Weather Bureau, Sacramento, director.*

COLORADO.

Temperature.—The mean was slightly above the normal on the eastern side of the mountains, and slightly below on the western slope; maximum, 83, at Orchard, 30th; minimum (—20, at Pikes Peak, 17th), —14, at Meeker, 16th; greatest monthly range, 74, at Minneapolis; least monthly range, 40, at Glen Eyrie.

Precipitation.—The average was slightly below the normal; greatest monthly (5.10, at Pikes Peak), 3.00, at Climax; least monthly, 0.00, at several stations.

Wind.—Prevailing direction, west.—*J. J. Gilligan, Observer, Weather Bureau, Denver, director.*

FLORIDA.

Temperature.—Maximum, 90, at Clermont, 9th; minimum, 31, at Fort Meade, 16th and 20th; greatest monthly range, 56, at Orange City; least monthly range, 24, at Key West.

Precipitation.—Greatest monthly, 2.94, at Pensacola; least monthly, trace, at Fort Meade.

Wind.—Prevailing direction, northwest.—*E. R. Demain, Observer, Weather Bureau, Jacksonville, director.*

GEORGIA.

Temperature.—Maximum, 88, at Cordele, 4th, and at Eastman, 3d and

4th; minimum, 15, at Diamond, 24th; greatest monthly range, 68, at Diamond; least monthly range, 28, at Macon.

Precipitation.—Greatest monthly, 9.37, at Lafayette; least monthly, 1.04, at Quitman.

Wind.—Prevailing direction, northwest.—*Park Morrill, Local Forecast Official, Weather Bureau, Atlanta, director.*

IDAHO.

Temperature.—Maximum, 72, at Boise Barracks, 4th; minimum, —17, at Lake, 9th; greatest monthly range, 67, at Lake; least monthly range, 28, at Ruthburg.

Precipitation.—Greatest monthly, 6.03, at Kootenai; least monthly, 0.08, at American Falls.—*J. H. Smith, Observer, Weather Bureau, Idaho Falls, director.*

ILLINOIS.

Temperature.—The mean was 3.5 below the normal; maximum, 76, at Jordans Grove, 13th; minimum, 4, at Aurora, Galva, and Oregon, 24th.

Precipitation.—The average was 0.06 below the normal; greatest monthly, 7.25, at Pana; least monthly, 0.55, at Oregon.

Wind.—Prevailing direction, northwest.—*John Craig, Observer, Weather Bureau, Springfield, director.*

INDIANA.

Temperature.—The mean was 3.1 below the normal; maximum, 67, at Jeffersonville, 1st; minimum, 7, at Lafayette, 24th; greatest monthly range, 53, at Rockville; least monthly range, 37, at Hawpatch.

Precipitation.—The average was 0.17 below the normal; greatest monthly, 4.90, at Indianapolis; least monthly, 2.50, at Irvington.

Wind.—Prevailing direction, northwest.—*Prof. H. A. Huston, Lafayette, director; C. F. R. Wappenhans, Local Forecast Official, Weather Bureau, assistant.*

IOWA WEATHER AND CROP SERVICE.

Temperature.—The mean was 3.0 below the normal; maximum, 70, at Glenwood, 12th; minimum, —3, at Charles City, 23d; greatest monthly range, 65, at Larrabee; least monthly range, 24, at Emmetsburg.

Precipitation.—The average was slightly below the normal; greatest monthly, 3.16, at Keokuk; least monthly, 0.05, at Sydney.

Wind.—Prevailing direction, northwest.—*J. R. Sage, Des Moines, director; G. M. Chappel, Local Forecast Official, Weather Bureau, assistant.*

KANSAS.

Temperature.—The mean was 0.1 below the normal; maximum, 79, at Shields, 5th, at Ulysses, 13th, and at Eldorado, 14th; minimum, 8, at Eureka Ranch, 21st, and at Shields, 3d; greatest monthly range, 71, at Shields; least monthly range, 43, at Sedan.

Precipitation.—The average was 0.03 below the normal; greatest monthly, 1.91, at Kansas City; least monthly, 0.00, at Burr Oak, McPherson, and Ulysses.

Wind.—Prevailing direction, northwest.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Observer, Weather Bureau, assistant.*

KENTUCKY.

Temperature.—The mean was 6.0 below the normal; maximum, 78, at Springfield, 13th; minimum, 9, at Harrodsburg, 24th; greatest monthly range, 67, at Springfield; least monthly range, 37, at Paducah.